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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/950,081	09/12/2001	Hiroya Okumura	2001-1255A	1556

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EXAMINER
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RUTHKOSKY, MARK

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 02/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/950,081

Applicant(s)

OKUMURA ET AL.

Examiner

Mark Ruthkosky

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8, 10-18 and 21-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-18 and 21-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102/103*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8, 10-18 and 21-23 are rejected under 35 U.S.C. 102(b) as being anticipated or, in the alternative, under 35 U.S.C. 103(a) as obvious over Butler (US 6,251,308.)

The instant claims are to a resin composition for a separator of a fuel cell, which comprises an electroconductive agent and a radical-polymerizable thermosetting resin system wherein the weight ratio of the electroconductive agent and a radical-polymerizable thermosetting resin system is 65/35 to 92/8. The method of making the resin composition includes kneading the electroconductive agent and radical-polymerizable thermosetting resin with a pressure kneader under a pressure of  $9.8 \times 10^3$  to  $9.8 \times 10^5$  Pa higher than atmospheric pressure.

Butler (US 6,251,308) teaches a resin composition for a homogeneous separator of a solid polymer fuel cell comprising an electroconductive agent and a radical-polymerizable

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thermosetting resin system (see column 1, lines 52-end, and column 4.) The electroconductive agent includes carbonaceous materials such as graphite in various concentrations including a range from 65/35 to 92/8 (col. 4, lines 37-65.) The radical-polymerizable thermosetting resin system includes a vinyl-ester series resin in which methacrylate is added to a bisphenol A resin (col. 4, lines 15-40.) A radical-polymerizable dilutant of styrene is added in a specific range (col. 4, lines 25-40.) The double bond equivalent and glass transition temperature of the composition are inherent features of the compound. Low-profile agents are noted throughout the reference (including the various compounds in columns 5 and 6.) The agents are added in the range of 0.1 to 30 parts (wt.) relative to the radical-polymerizable thermosetting resin system. An example includes polyvinyl acetate (col. 6, lines 37-end.) Molding and mixing the materials, including pressure kneading and molding, are noted in col. 6, line 60 to col. 7. It is noted that mixing inherently involves applying pressure to the material and that kneading and mixing are equivalent processes. The materials are formed into a flow field plate, which is used in a solid polymer fuel cell.

With regard to the limitation that the resin is kneaded with a pressure kneader under a pressure of  $9.8 \times 10^3$  to  $9.8 \times 10^5$  Pa higher than atmospheric pressure, this limitation is a product by process limitation. MPEP 2113 states, "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." Thus, the claims are anticipated.

Claims 1-7, 10-11, 13, 16-18 and 21-23 are rejected under 35 U.S.C. 102(b) as being anticipated or, in the alternative, under 35 U.S.C. 103(a) as obvious over Wilson (WO 00/25372.)

Wilson (WO 00/25372) teaches a separator plate of a solid polymer fuel cell comprising a resin composition of an electroconductive agent and a radical-polymerizable thermosetting resin system (see claims 1-14 and page 4.) The electroconductive agent includes carbonaceous materials such as graphite in various concentrations including a range from 65/35 to 92/8 (p. 6, lines 10-15, Table III.) The radical-polymerizable thermosetting resin system includes a vinyl-ester series resins (p. 4, lines 20-end.) Methacrylated epoxy polymers are noted. The double bond equivalent and glass transition temperature of the composition are inherent features of the compound. Dilutant materials are taught in the paragraph bridging pages 6-7. Fiber resins of similar nature including polyester or polyacrylonitrile may be added. The addition of a polyester may also constitute a low-profile agent. Molding and mixing the materials, including pressure kneading and molding, are noted on page 8. It is noted that mixing inherently involves applying pressure to the material and that kneading and mixing are equivalent processes. The materials are formed into a flow field plate, which is used in a solid polymer fuel cell.

With regard to the limitation that the resin is kneaded with a pressure kneader under a pressure of  $9.8 \times 10^3$  to  $9.8 \times 10^5$  Pa higher than atmospheric pressure, this limitation is a product by process limitation. MPEP 2113 states, "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the

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product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” Thus, the claims are anticipated.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8, 10-18 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Butler (US 6,251,308, as applied above, and further in view of Saito et al (US 6,436,567.)

Butler (US 6,251,308) teaches a resin composition for a separator of a solid polymer fuel cell comprising an electroconductive agent and a radical-polymerizable thermosetting resin system, as previously noted, (see column 1, lines 52-end, and column 4.) The mixture includes rheological agents that eliminate phase separation and give more uniform electrical and mechanical properties (col. 3, lines 20-45.) Mixing includes the use of a high shear cowels disperser to blend until mixing is complete (col. 9, lines 50-end.) Butler (US 6,251,308) does not teach that the mixing of the electroconductive agent and the thermosetting resin system is accomplished with a pressure kneader under a pressure of  $9.8 \times 10^3$  to  $9.8 \times 10^5$  Pa higher than atmospheric pressure. Butler (US 6,251,308) teaches that the separator compositions may be formulated and mixed using a variety of mixing conditions including either continuous or batch and using a variety of known mixing equipment (col. 6, lines 60-end.)

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Saito et al (US 6,436,567) teaches a fuel cell and a separator for the fuel cell comprising a conductive carbon powder mixed with a thermosetting polymer binder compound (claims 1-10.) The conductive carbon material and the binder are mixed by commonly used industrial mixing methods. Pressure kneaders are noted as the known mixing equipment (col. 3, lines 35-end.) The composition is then molded into a separator plate (col. 4, lines 1-35.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to mix the separator composition of Butler with a pressure kneader, as taught in Saito, in order to homogeneously mix the conductive carbon and the thermosetting binder and form a separator plate. The known mixing methods disclosed in Saito will mix the materials in a homogeneous manner taught by Butler. One of ordinary skill in the art would recognize the optimum conditions, such as pressure and time of mixing, needed to mix the components into a plate that has high conductivity, high strength and high gas impermeability (Saito col. 1, lines 1-25 and Butler, col. 3, lines 1-41.) Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation, In re *Aller, Lacey and Hall*, 105 U.S.P.Q. 233, 235. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

### ***Response to Arguments***

Applicant's arguments filed 11/21/2005 have been considered, but are not persuasive.

With regard to the applicant's arguments to the rejection based on Butler et al., the applicant notes that the reference teaches a ratio of conductive material to binder resin at various points in the claimed range of 65/35 to 92/8, but that the reference does not teach a product made

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by a process wherein the conductive agent and resin are kneaded with a pressure kneader under a pressure of  $9.8 \times 10^3$  to  $9.8 \times 10^5$  Pa higher than atmospheric pressure.

With regard to the applicant's arguments that the references do not teach a product made by a process wherein the conductive agent and resin are kneaded with a pressure kneader under a pressure of  $9.8 \times 10^3$  to  $9.8 \times 10^5$  Pa higher than atmospheric pressure, it is noted that this limitation is a product by process limitation. MPEP 2113 states, "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." The claimed invention is a product that is anticipated by the product of the applied prior art.

The declaration under 37 CFR 1.132 filed 9/27/2005, has been fully considered, but is insufficient to overcome the rejection based upon Butler (US 6,251,308) because the declaration does not provide a proper comparison of molded plates as noted in the prior art reference. The main components of the separator plate of the reference include a graphite electroconductive agent, a modifier and a radical-polymerizable thermosetting resin system. Other components include an initiator, an inhibitor, a release agent and a modifier. All of the components are noted in Butler with reference to the source supplier and characteristics. Applicant was unable to obtain these materials and has attempted to use similar materials. However, of the three main components in the mixture, none of the materials are the same. Thus, the product cannot be considered the same.



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Applicant argues that similar materials are used. This is not sufficient to show that the plate of the prior art does not read upon the claimed invention. For example, if the materials of the reference include a graphite conductive agent with a smaller particle size, the plate would have a smoother texture as compared with a coarse particle property, as noted in the declaration. In addition, the relative amounts of materials are not the same in the experiments, as in the prior art example. The amount of material in the reference is shown below in the first column. The amount of material in the experiment of the declaration is shown in the second column. The amount of dilutant does not appear to be the same and the amount of modifier is significantly less. The modifier is taught in the reference to be critical in making a homogeneous mixture as it eliminates phase separation (col. 3, line 1-30.)

Resin	100	100
Dilutant	54-58% of resin	956 resin with 886 dilutant
Initiator	2.02	2.02
Inhibitor	0.50	0.50
Release	6.06	6.06
Graphite	378.60	378.60
Modifier	17.62	10.12

Further, it is not clear that sample B of the declaration is a proper comparison plate, as it was not stated in the declaration to be from applicant's specification. Applicant's arguments with regard to the properties of the separator plate are not sufficient to overcome a rejection under 35 U.S.C. 102.

With regard to the remarks submitted on 11/21/2005, applicant argues that the difference between the materials used in the experiment for the prior art embodiment and the actual materials used in the prior art are inconsequential. This statement is not supported with any

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evidence and therefore, it is not clear what effects the changes will have on the prior art. The prior art shows the same mixture and composition of materials as claimed in the instant invention, and describes the corresponding separator plate to be homogeneous mixture with improved electrical and mechanical properties, as compared with compositions that have separation of the conductive carbon and the thermosetting polymer binder, (col. 3 of Butler, as noted.) Thus, the arguments and exhibits are not persuasive.

***Examiner Correspondence***

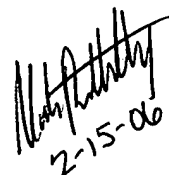
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Ruthkosky

Primary Patent Examiner

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2-15-06